SAN JUAN COUNTY AML PARTNERSHIPS

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ABSTRACT

The recent interest in abandoned mine problems from many diverse agencies and groups is requiring even more effective collaboration. The secret of successful abandoned mine reclamation projects is to locate interested groups, learn to communicate, and find common ground. In San Juan County there were many challenges and opportunities for abandoned mine land reclamation work. Challenges included local participation and anxiety over problems that threatened the community's image, endangered its historical and cultural values, and jeopardized its economic well being. The opportunities were found in the interest, technical expertise, and funding support from state and federal agencies. The ability of different sectors, organizations, and individuals to collaborate was realized. Together their time, assets, and commitment have tackled the most difficult abandoned mine land issues. Through joint work, many groups accomplished long-term objectives that would have been impossible to achieve individually and have strengthened the abandoned mine program in Colorado.

The Colorado Inactive Mine Reclamation Program (IMP) has addressed AML issues - hazards, water quality, and historic preservation - in San Juan County with a multitude of partners. In some cases the IMP has taken the lead, in some it has been a major participant, and in still others it has been quietly in the background helping facilitate activities. These partnerships, tailored to specific activities, are synergistic and have helped make the AML efforts in the county accepted and successful. With some background for perspective, here is how we make this countywide AML effort work.

This is one of the most rugged counties in Colorado. Lying in the heart of the San Juan Mountains which range to over 14,000 feet high, there are few level spots in the county. Vistas are dominated by this alpine terrain along with evidence of past mining activity. Such evidence is considered an asset to the economy and a drawing card for tourism. Snow avalanche paths on the mountain sides are more numerous and of greater visual impact than most of the easily visible mining scars.

Even though mines stopped producing decades ago, San Juan County's economy is still driven by their presence. At 387 square miles, this one of the smallest counties in the state. Its year-round population of 558 is supported by the tourism industry rather than mining. Though the mining is gone, a vivid community spirit lives on today.

HISTORY

Gold was discovered here in 1860, and after negotiations with Chief Ouray of the Ute Tribe, the country was opened for settlement. The Town of Silverton was platted in 1874, and by 1875, the population had doubled. The mountains were filled with gold and silver, and mines with names such as the Silver Lake, the Iowa, the Royal Tiger, and the Gold Prince produced millions. Otto Mears, "Pathfinder of the San Juans," built his famous "Rainbow Route" - one of three railroads that carried ore to the smelters in Silverton from the high camps. Mining reached

its peak between 1900 and 1912, and the population of San Juan County peaked at 5,000. Over 30 mills and two smelters had been built by the turn of the century. Hundreds of millions of dollars of gold and silver were extracted from the mines. Silverton was the metropolis of the district, and by 1902, had a complete water and sewer system, telephone service, and a municipally owned electric power company.

Production history began in San Juan County in 1873 and by 1908 over $45 million in precious, mainly silver, and base metals had been produced. The last mine, Sunnyside Gold closed in 1991. Reclamation there is underway.

AML ISSUES

But these mines that provide a livelihood to the sparse population of Silverton, also left their mark along the landscape and threaten water quality in the Animas River, which drains the district. In 1980 the Colorado inventory noted 405 mine openings in the county.

To address AML problems statewide, Colorado's AML program realized that it could only be successful if it had the support of the various communities involved: landowners, mining industry, the environmental interests, historic preservation groups, local government, and land management agencies. One of the first things some of the miners with small older mines noted was that "there are no abandoned mines; only idle or inactive mines waiting to be reopened." Committed to a voluntary program and knowing that we needed the support of miners and landowners, we immediately adopted the idea into our program name. We have been the "Inactive Mine Reclamation Program" since 1980 and have worked hard to obtain and retain the trust and support of "abandoned" mine owners. This also led to the organization of our still functioning Inactive Mine Program Advisory Council. It is composed of representatives from coal mining, hardrock mining, environmental interests, local government, academia, mineral collectors, historical interests, and land management agencies.

INVENTORY

During the summer of 1980, we had 14 people combing the mineralized areas of Colorado to collect information about the extent and nature of the AML problem. Detailed information about 8,656 hazardous mine openings was collected that summer. It was the perfect job for the field teams – mostly recent graduates of natural resource and environmental programs. Imagine, someone paying you to wander around in some of the most scenic parts of Colorado to practice using your newly acquired skills and knowledge. That original "reconnaissance" inventory would provide the basis for Colorado's Inactive Mine Reclamation Plan and guidance for addressing the legacy of pre-law mining problems in the State. Subsequent investigations have led us to estimate that 23,000 hazardous mine features exist in the State; about 22,000 of them at hardrock mines.

In San Juan County, our reconnaissance inventory centered on the major mining districts. The Silverton, Howardsville, Eureka-Animas Forks districts as well as more remote areas such as Arrastra Basin were visited and studied in the field. The county is very scenic and extremely popular with campers, hikers, and 4-wheelers. Many come to explore and photograph the rustic old mines as well as for the scenic beauty. An advertisement for a local commercial campground exhorts visitors to "pan for gold, go for a jeep ride, visit ghosts towns or old abandoned mines." Some areas are remote and accessible only by foot trails through rugged

terrain, and many mine openings are located on steep mountainsides, inaccessible to all but the most determined climbers. The most common mining method used in the county was tunneling into steep mountain or valley walls along mineralized faults or fractures. Comparatively few shafts were used. Only 38 shafts were encountered during the 1980 field season. Fifteen open stopes were also recorded. There were 352 adits or horizontal mine openings examined. Most of these were considered hazardous because of the ease of accessibility and possible connections with vertical workings. Several had significant discharges of acid mine water draining into local streams. Over 300 mine dumps were also evaluated in this initial study.

The reconnaissance inventory covered all the more accessible and historic mines which attract visitors and could be used as a basis for determining priorities of those hazardous mine areas in need of reclamation or safeguarding. In fact, when an updated estimate of inactive and abandoned non-coal mine problems was prepared for the Western Governors' Association Mine Waste Task Force in 1991, San Juan County was shown to have an estimated 500 hazardous mine openings – up from the 405 visited and recorded in 1980.

SAFEGUARDING

With this inventory in hand Colorado soon began the business of actually reclaiming and safeguarding sites. As the law required, Colorado first addressed hazardous coal mine features, then environmental problems associated with coal mines, and finally hazardous hardrock mine features. San Juan County has no coal mines so it wasn't until several years into the program that safeguards began being placed on the hardrock mine openings there. The first project was completed in the Red Mountain Pass area in late 1988.

Since the program first began receiving funds to do on the ground reclamation in 1982 we have safeguarded 6,127 hazardous mine features statewide. In San Juan County, six projects have been completed with 257 extremely hazardous mine openings safeguarded. The close proximity of mine openings to Silverton and their accessibility have also provided an excellent laboratory for OSM's National Technical Training Program's AML Design Workshop for Dangerous Openings. Three of these field oriented workshops conducted by Colorado and OSM AML staff have been held in Silverton.

Closures techniques include the use of precast concrete panels, steel grating, polyurethane foam, bulkhead seals, and backfilling. Because of the interest in preserving the historical character of the mines, the San Juan Board of County Commissioners reviews all closure proposals before work takes place. Closures methods are regularly modified to help stabilize remaining mining structures. Although the sites are at high elevations, some bat habitat has been identified by the Division of Wildlife and is accommodated with grated closures that allow bats' ingress and egress. Local interest in the IMP activities is high as evidenced by the cost sharing of many landowners, the cooperation of mining companies, and the involvement of local contractors.

HAZARDOUS OPENINGS SAFEGUARDED

Project name	**# of shafts & stopes**	**# of adits**	**Cost**	Date Completed
Red Mountain	20	7	$ 71,333	1988
San Juan	57	19	335,729	1990
Ouray	17	15	108,979	1990

Silverton	10	22	52,200	1996
Mineral Creek	8	46	100,970	1997
Adelaide	4	32	94,916	2000
Maid of the Mist	21	18	150,000	Scheduled for 2002
Totals to date	116	141	914,127	

WATERSHED RESTORATION

Along with safeguarding hazardous mine openings, the IMP has become involved in other problems at inactive mines. Mining related nonpoint source pollution in Colorado is widespread and diverse. There are 605 miles of stream in Colorado that are affected by heavy metal contamination. Sediment resulting from past mining and milling activities contributes to the contamination of additional waters and streams.

In Colorado, most of the mining related nonpoint source pollution results from inactive metal mines. These mine sites present some of the most difficult challenges to water quality improvement in Colorado, and the nation. This is due to the nature of the pollutants, and also to the difficult administrative and legal challenges involved with controlling the sources of pollutants. Without intervention, most of these sites will not be naturally reclaimed. Many of these sites are "orphan sites", or are owned by individuals who were not involved in either the mining activities that created these water quality problems, or the financial benefit from the mining. In addition to these complicating factors, it is important to recognize that the majority of the hardrock inactive mining sites are found in remote locations, at high altitudes, and with a minimal infrastructure of roads and power.

San Juan County comprises the upper Animas River watershed - one of the most heavily mineralized and mining impacted areas in the state. Seventy-one miles, a high percentage of all stream miles in San Juan County, are impacted by past mining activity. Heavy metals and acid mine drainage have destroyed the biological integrity of many reaches in the watershed.

In order to address non-point source pollution from mining activity, in-depth studies are necessary to analyze the impacts from specific sites and sources and to determine the potential for improving water quality. Four reclamation feasibility reports have been prepared by Division of Minerals & Geology staff for use as a guidance document by the Animas River Stakeholders Group (ARSG) in prioritizing and planning water quality reclamation projects at mine sites in the watershed. Using this information the ARSG has prioritized 33 mine adits and 32 waste piles for remediation. The IMP has also prepared additional site specific feasibility reports for some of these priority sites.

The ultimate goal of this work is to improve the water quality and fisheries of the Animas River downstream of Silverton by reclaiming abandoned mine sites upstream of the town. Because the IMP funding for these water quality projects is restricted by SMCRA, we focus on providing technical assistance and support to the primary project sponsors.

PROJECTS COMPLETED WITH 319 FUNDS

Project Site	**Products**	**Project Date**	Project Sponsor/ **Funding Source**
Mineral Creek/	High and Low flow samples	1997	CDPHE, DMG/ 319

Project Site	**Products**	**Project Date**	Project Sponsor/ **Funding Source**
Targeting and Characterization	taken. Detailed loading analysis report		Funds
Cement Creek/ Targeting and Characterization	High and Low flow samples taken. Detailed loading analysis report	1998	DMG/319 Funds
Lower Animas Targeting and Characterization	High and Low flow samples taken. Detailed loading analysis report	1998	DMG/319 Funds
Upper Animas Targeting and Characterization	High and Low flow samples taken. Detailed loading analysis report	1999	DMG/319 Funds
Mineral Creek	Remove mine waste from drainages and revegetate.	1999-2001	San Juan RC& D/ 319 Funds
Silver Wing Mine	Construct biological treatment system for acid mine drainage	1999-2001	Landowner/ 319 Funds
Mammoth Tunnel	Construct settling pond treatment facility for acid mine drainage	1999	Landowner/ 319 Funds

PROJECTS COMPLETED WITH OTHER FUNDING SOURCES

Project Site	**Products**	**Project Date**	**Project Sponsor/ Funding Source**
MRRC Mine	Removed mine waste from stream. Constructed ALD to treat mine drainage	1994	Landowner
Joe and Johns Adit	Opened mine portal to capture and quantify mine drainage.	1998	BLM/ BLM Funds
Galena Queen	Constructed upland diversion ditches.	1998	DMG/ OSM Funds
Forest Queen	Passive mine drainage treatment system	1999	BLM
Mayday/ Lackawanna	Hydrologic controls and mill tailings removal	2000	BLM
16 major mine sites	Hydrologic mine seals, mine and mill waste removal, hydrologic controls at waste piles	1991-1999	Sunnyside Gold Corp.
Gold King	Hydrologic controls for mine workings and mine waste	1998	Gold King Mines Corp.

MINING HERITAGE

Across the state, people in the public and private sectors work hard to retain Colorado's unique historic character. In the course of developing and implementing the safeguarding and watershed restoration activities at abandoned or inactive mines the program considers the historic and cultural resource aspects of each project. The program has provided documentation of the area's existing historic mining resources, assisted with stabilization of historic properties, worked with the local community to promote an awareness of mining history, and encouraged tourism to Colorado's mining communities.

The people of San Juan County, like many Coloradoans are increasingly aware of mining's historic significance and are expressing a commitment to its preservation. San Juan County, the Town of Silverton and the San Juan County Historical Society have developed cooperative efforts that contribute to the success of their mission to advance heritage tourism in San Juan County and preserve the unique mining resources.

One special project that IMP worked on in cooperation with several partners was the stabilization of Old Hundred Mine Boarding House and Tramway Terminal. This property represents one of the few remaining sites typical of the tramway-dependent mining systems of the San Juan district. The two buildings are perched 2000 feet above Cunningham Gulch up Galena Mountain on the face of a steep cliff, in one of the West's most rugged, weather-beaten and inaccessible mining districts. The Boarding House and Tramhouse provide one of the better-preserved examples of the remarkable resourcefulness, perseverance, and inventiveness that miners would resort to for the removal of valuable ores and are a model of the technology typical of the San Juans. The Old Hundred Tourist Mine operation in the valley bottom is visited annually by thousands of tourists, students and historians seeking clues to the patterns of Western culture and industry and to the legacy of mining in Colorado.

The roof of the boarding house was partially collapsed and caused some damage to the second-story floor. The roof of the tramhouse is completely collapsed. Severe weather damage and marmots who enjoyed chewing on the wooden portions of the two buildings damaged the remaining intact lumber inside the structures. The boardwalk which once linked the boarding and tramhouses was no longer in place, and may have been swept away by avalanches. Some of the tin siding was missing from both buildings, and there were no remaining doors or glass in the windows. The stabilization work is done in conjunction with the safeguarding of hazardous open adits.

The Colorado Division of Minerals and Geology, in conjunction with the San Juan County Historical Society, were awarded a State Historic Preservation grant to devise a construction plan to stabilize the remaining buildings of the Old Hundred Boarding House and Tramhouse. The BLM also provided matching funds. In the summer of 2000 the Old Hundred Boarding House was stabilized with a new tin roof and other portions of the old boarding house were reinforced. The San Juan Historical Society plans to stabilize the tramhouse during the summer of 2002.

CONCLUSION -- MAKING IT WORK

The ability to work together in San Juan County and leverage assets—human, economic, and civic—has created a unique model that deserves duplicating. The Colorado IMP has found unusual partners and new participants to contribute to the state's abandoned mine reclamation problems. We firmly believe that this is the future of abandoned mine land reclamation. Developing strong connections to the local community and working with a variety of groups to leverage funding has enabled the IMP to establish credibility, respond to local needs, and fulfill the goals of the abandoned mine land reclamation program as established under the Surface Mining Control and Reclamation Act.

Here is a partial listing of the many partners who have contributed to the abandoned mine land reclamation effort. Many other silent partners also participated.

Federal – provide funding and technical expertise
Office of Surface Mining, Bureau of Land Management, U. S. Forest Service, Environmental Protection Agency, U.S. Geological Survey, Bureau of Reclamation.

State – provide funding, technical expertise and in-kind services
Colorado Division of Minerals and Geology; Colorado Dept of Health, Water Quality and Hazardous Waste Divisions; Division of Wildlife; Colorado Geological Survey; Colorado Division of Water Resources: Department of Local Affairs; Department of Transportation; Scenic by Ways Commission; Colorado State Historical Society; Colorado State Historic Preservation Fund; Youth in Natural Resources; Western Governors' Association.

Local – provide funding, technical expertise, in-kind services and spirit
San Juan County, Upper Animas Stakeholders Group, Sunnyside Gold, San Juan Historical Society, Klinke & Lew; Red Mountain Task Force, Town of Silverton, San Juan Resource Conservation Development Council, Silver Wing Co, Inc.; Salem Minerals; Gold King Mining Co.; Echo Bay Mining,

REFERENCES

"Colorado Inactive Mine Reclamation Plan, Inactive Coal and Metal Mines of Colorado." Department of Natural Resources, Mined Land Reclamation Division. 1982. Volume II

Reclamation Feasibility Reports: Animas River Below Eureka, Upper Animas River Basin, Mineral Creek, Animas River Below Eureka. 1997-2001 Colorado Division of Minerals and Geology.